

CLAIMS

1. Peptide vector for transfecting a chemical substance selected from the group consisting of nucleic acid sequences, proteins, peptides and pharmacologically active chemical substances, characterized in that it contains, in addition to the said chemical substance, at least one transfecting peptide derived from the whole or part of a fibre of an adenovirus selected from the group consisting of Ad2, Ad3, Ad4, Ad7, Ad8, Ad9, Ad11, Ad12, Ad15, Ad16, Ad21, Ad40, Ad41, FAV1 (CELO) and FAV7, which transfecting peptide comprises at least:

- a segment of an NLS sequence derived from an adenovirus fibre comprising between 4 and 5 amino acids and including a sequence selected from the group consisting of the following sequences:  $X_0$ -Lys-Arg-Val-Arg ( $X_0$ KRVR) (SEQ ID NO:1),  $X_0$ -Lys-Arg-Ala-Arg ( $X_0$ KRAR) (SEQ ID NO:2),  $X_0$ -Lys-Arg-Ser-Arg ( $X_0$ KRSR) (SEQ ID NO:3),  $X_0$ -Lys-Arg-Leu-Arg ( $X_0$ KRLR) (SEQ ID NO:4),  $X_0$ -Lys-Arg-Thr-Arg ( $X_0$ KRTR) (SEQ ID NO:5),  $X_0$ -Pro-Lys-Lys-Pro-Arg ( $X_0$ PKKPR) (SEQ ID NO:6), in which  $X_0$  is zero or represents Thr (T), Ala (A), Ser-Lys (SK) or Ser (S), or a segment of the SV40 virus Vp3 protein and in particular the sequence GPNKKKRKL (SEQ ID NO:24),

- a hydrophobic sequence comprising between 7 and 50 amino acids, derived from an adenovirus fibre and selected from the group consisting of at least one of the following sequences  $X_1$ -Phe-Asn-Pro-Val-Tyr-Pro-Tyr- $X_2$  ( $X_1$ FNPVYPY $X_2$ ) (SEQ ID NO:7),  $X_1$ -Phe-Asp-Pro-Val-Tyr-Pro-Tyr- $X_2$  ( $X_1$ FDPVYPY $X_2$ ) (SEQ ID NO:8), in which:

$X_1$  is zero or represents a sequence of at most 43 amino acids, preferably a sequence of 5 to 15 amino acids, comprising hydrophobic and/or polar and/or acidic charged amino acids, and in particular one of the following sequences: Leu-Ser-Asp-Ser (LSDS) (SEQ ID NO:9), Leu-Ser-Thr-Ser (LSTS) (SEQ ID NO:10), Leu-Ser-Ser-Ser (LSSS) (SEQ ID NO:11), Pro-Ser-Glu-Asp-Thr

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(PSED) (SEQ ID NO:12), Val-Asp-Asp-Gly (VDDG) (SEQ ID NO:13), Thr-Gln-Tyr-Ala-Glu-Glu-Thr-Glu-Glu-Asn-Asp-Asp (TQYAEETEEND) (SEQ ID NO:14) or X<sub>3</sub>-Glu-Asp-Asp (X<sub>3</sub>EDD) (SEQ ID NO:15) in which X<sub>3</sub> represents Ala (A), Val (V),  
5 Leu (L), Phe (F) or Ile (I) and

X<sub>2</sub> is zero or represents a sequence of at most 43 amino acids, preferably a sequence of 5 to 15 amino acids, comprising hydrophobic and/or polar and/or charged amino acids, and in particular one of the  
10 following sequences: Glu-Asp-Glu-Ser (EDES) (SEQ ID NO:16), Asp-Thr-Glu-Thr (DTET) (SEQ ID NO:17), Asp-Ala-Asp-Asn (DADN) (SEQ ID NO:18), Asp-Pro-Phe-Asp (DPFD) (SEQ ID NO:19), Gly-Tyr-Ala-Arg (GYAR) (SEQ ID NO:20), Glu-His-Tyr-Asn (EHYN) (SEQ ID NO:21), Asp-Thr-Ser-Ser  
15 (DTSS) (SEQ ID NO:22) or Asp-Thr-Phe-Ser (DTFS) (SEQ ID NO:23) and

- a polymeric sequence of basic amino acids or a cationic polymeric sequence or a polyalcohol, for use as a medicament.

20 2. Peptide vector for transfecting a chemical substance selected from the group consisting of nucleic acid sequences, proteins, peptides and pharmacologically active chemical substances, characterized in that it contains, in addition to the  
25 said chemical substance, at least one transfecting peptide derived from the whole or part of a fibre of an adenovirus selected from the group consisting of Ad2, Ad3, Ad4, Ad7, Ad8, Ad9, Ad11, Ad12, Ad15, Ad16, Ad21, Ad40, Ad41, FAV1 (CELO) and FAV7, which transfecting  
30 peptide comprises at least:

- a segment of an NLS sequence derived from an adenovirus fibre comprising between 4 and 5 amino acids and including a sequence selected from the group consisting of the following sequences: X<sub>0</sub>-Lys-Arg-Val-Arg (X<sub>0</sub>KRVR) (SEQ ID NO:1), X<sub>0</sub>-Lys-Arg-Ala-Arg (X<sub>0</sub>KRAR) (SEQ ID NO:2), X<sub>0</sub>-Lys-Arg-Ser-Arg (X<sub>0</sub>KRSR) (SEQ ID NO:3), X<sub>0</sub>-Lys-Arg-Leu-Arg (X<sub>0</sub>KRLR) (SEQ ID NO:4), X<sub>0</sub>-Lys-Arg-Thr-Arg (X<sub>0</sub>KRTR) (SEQ ID NO:5), X<sub>0</sub>-Pro-Lys-Lys-

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Pro-Arg ( $X_0$ PKKPR) (SEQ ID NO:6), in which  $X_0$  is zero or represents Thr (T), Ala (A), Ser-Lys (SK) or Ser (S), or a segment of the SV40 virus Vp3 protein and in particular the sequence GPNKKKRKL (SEQ ID NO:24),

5           - a hydrophobic sequence comprising between 7 and 50 amino acids, derived from an adenovirus fibre and selected from the group consisting of at least one of the following sequences  $X_1$ -Phe-Asn-Pro-Val-Tyr-Pro-Tyr- $X_2$  ( $X_1$ FNPVYPY $X_2$ ) (SEQ ID NO:7),  $X_1$ -Phe-Asp-Pro-Val-Tyr-Pro-Tyr- $X_2$  ( $X_1$ FDPVYPY $X_2$ ) (SEQ ID NO:8), in which:

10            $X_1$  is zero or represents a sequence of at most 43 amino acids, preferably a sequence of 5 to 15 amino acids, comprising hydrophobic and/or polar and/or acidic charged amino acids, and in particular one of the following sequences: Leu-Ser-Asp-Ser (LSDS) (SEQ ID NO:9), Leu-Ser-Thr-Ser (LSTS) (SEQ ID NO:10), Leu-Ser-Ser-Ser (LSSS) (SEQ ID NO:11), Pro-Ser-Glu-Asp-Thr (PSED) (SEQ ID NO:12), Val-Asp-Asp-Gly (VDDG) (SEQ ID NO:13), Thr-Gln-Tyr-Ala-Glu-Glu-Thr-Glu-Glu-Asn-Asp-Asp (TQYAEETEENDD) (SEQ ID NO:14) or  $X_3$ -Glu-Asp-Asp ( $X_3$ EDD) (SEQ ID NO:15) in which  $X_3$  represents Ala (A), Val (V), Leu (L), Phe (F) or Ile (I) and

15            $X_2$  is zero or represents a sequence of at most 43 amino acids, preferably a sequence of 5 to 15 amino acids, comprising hydrophobic and/or polar and/or charged amino acids, and in particular one of the following sequences: Glu-Asp-Glu-Ser (EDES) (SEQ ID NO:16), Asp-Thr-Glu-Thr (DTET) (SEQ ID NO:17), Asp-Ala-Asp-Asn (DADN) (SEQ ID NO:18), Asp-Pro-Phe-Asp (DPFD) (SEQ ID NO:19), Gly-Tyr-Ala-Arg (GYAR) (SEQ ID NO:20), Glu-His-Tyr-Asn (EHYN) (SEQ ID NO:21), Asp-Thr-Ser-Ser (DTSS) (SEQ ID NO:22) or Asp-Thr-Phe-Ser (DTFS) (SEQ ID NO:23), which transfecting peptide is combined with a polymeric sequence of basic amino acids, a cationic polymer or a polyalcohol,

25           for use as a medicament.

3.           Transfection vector according to Claim 1 or Claim 2, characterized in that the polymeric sequence

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of basic amino acids comprises between 10 and 50 amino acid residues, selected from the group consisting of lysine, arginine and ornithine.

4. Transfection vector according to any one of Claims 1 to 3, characterized in that the cationic polymeric sequence is selected from the group consisting of polymeric amines.

5. Transfection vector according to any one of Claims 1 to 4, characterized in that the NLS sequence is at the N-terminal end of the transfecting peptide and the polymeric sequence of basic amino acids is at the C-terminal end of the said transfecting peptide.

6. Transfection vector according to any one of Claims 1 to 5, characterized in that when the chemical substance is a nucleic acid, the transfecting peptide/nucleic acid ratio is between 0.3:1 and 15:1, preferably between 2:1 and 6:1, preferably between 4:1 and 6:1.

7. Transfection vector according to any one of Claims 1 to 6, characterized in that it is combined with a targeting ligand.

8. Composition, characterized in that it essentially consists of a transfection vector according to any one of Claims 1 to 7 and a suitable vehicle selected from the group consisting of bile salts, antiproteases, cyclodextrins and derivatives thereof, antiseptics and polyols, for use as a medicament.

9. Method of transfecting eukaryotic cells in vitro with a chemical substance selected from the group consisting of nucleic acid sequences, proteins, peptides and pharmacologically active chemical substances, characterized in that it comprises the bringing into contact and the incubation of a transfection vector according to any one of Claims 1 to 8, in a dilution buffer comprising 100-150 mM NaCl with eukaryotic cells for 15 to 120 minutes at room temperature, the chemical substance to be transfected:transfecting peptide ratio being between

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0.3:1 and 15:1, preferably between 2:1 and 6:1, preferably between 4:1 and 6:1.

10. Peptide vector for transfecting a chemical substance selected from the group consisting of nucleic acid sequences, proteins, peptides and pharmacologically active chemical substances, characterized in that it contains, in addition to the said chemical substance, at least one transfecting peptide which comprises:

- a segment of an NLS sequence consisting of sequence ID NO:2,

- a segment of a sequence consisting of sequence ID NO:10,

- a segment of a sequence consisting of sequence ID NO:16, and

- a polylysine,  
for use as a medicament.